```
FILE 'REGISTRY' ENTERED AT 14:35:46 ON 17 NOV 2003

=> S CARRAGEENASE/CN
L1             1 CARRAGEENASE/CN

=> D

L1   ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2003 ACS on STN
RN   95990-27-5  REGISTRY
CN   Carrageenanase (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN     ***Carrageenase***
MF   Unspecified
CI   MAN
LC   STN Files:   BIOBUSINESS, BIOSIS, CA, CAPLUS, USPATFULL

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
               6 REFERENCES IN FILE CA (1907 TO DATE)
               6 REFERENCES IN FILE CAPLUS (1907 TO DATE)


=> S IOTA CARRAGEENASE/CN
L2             0 IOTA CARRAGEENASE/CN

=> S IOTA-CARRAGEENASE/CN
L3             0 IOTA-CARRAGEENASE/CN

FILE 'CAPLUS' ENTERED AT 14:36:35 ON 17 NOV 2003

=> S L1;S CARRAGEENASE;S IOTA(W)CARRAGEENASE
L4             6 L1


              50 CARRAGEENASE
              15 CARRAGEENASES
L5            52 CARRAGEENASE
                   (CARRAGEENASE OR CARRAGEENASES)


            2874 IOTA
              50 CARRAGEENASE
              15 CARRAGEENASES
              52 CARRAGEENASE
                   (CARRAGEENASE OR CARRAGEENASES)
L6            15 IOTA(W)CARRAGEENASE

=> S ALTEROMONAS;S FORTIS;S CYTOPHAGA;S DROBACHIENSIS;S DELESSERIA;S SANGUINEA
L7           671 ALTEROMONAS


              53 FORTIS
              19 FORTES
L8            72 FORTIS
                   (FORTIS OR FORTES)


             992 CYTOPHAGA
              14 CYTOPHAGAS
L9           996 CYTOPHAGA
                   (CYTOPHAGA OR CYTOPHAGAS)


L10           44 DROBACHIENSIS


L11           40 DELESSERIA


L12          482 SANGUINEA

=> S (L4,L5,L6)
```

L13 54 ((L4 OR L5 OR L6))

=> S L13 AND L7;S L13 AND L9;S L13 AND L11
L14 9 L13 AND L7

L15 9 L13 AND L9

L16 1 L13 AND L11

=>
=>
=> S L14,L15,L16
L17 16 (L14 OR L15 OR L16)

=> D 1-16 CBIB ABS

L17 ANSWER 1 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2003:883288 The Structural Bases of the Processive Degradation of .iota.-Carrageenan, a Main Cell Wall Polysaccharide of Red Algae. Michel, Gurvan; Helbert, William; Kahn, Richard; Dideberg, Otto; Kloareg, Bernard (Place Georges Teissier, Station Biologique de Roscoff, UMR 7139 (CNRS/UPMC/Laboratories Goemar), Vegetaux Marins et Biomolecules, BP 74, Roscoff Cedex, Brittany, 29682, Fr.). Journal of Molecular Biology, 334(3), 421-433 (English) 2003. CODEN: JMOBAK. ISSN: 0022-2836. Publisher: Elsevier.
AB .iota.-Carrageenans are sulfated 1,3-.alpha.-1,4-.beta.-galactans from the cell walls of red algae, which auto-assoc. into cryst. fibers made of aggregates of double-stranded helixes. . ***iota*** .- ***Carrageenases*** , which constitute family 82 of glycoside hydrolases, fold into a right-handed .beta.-helix. Here, the structure of ***Alteromonas*** fortis . ***iota*** .- ***carrageenase*** bound to .iota.-carrageenan fragments was solved at 2.0 A resoln. (PDB 1KTW). The enzyme holds a .iota.-carrageenan tetrasaccharide (subsites +1 to +4) and a disaccharide (subsites -3, -4), thus providing the first direct detn. of a 3D structure of .iota.-carrageenan. Electrostatic interactions between basic protein residues and the sulfate substituents of the polysaccharide chain dominate .iota.-carrageenan recognition. Glu245 and Asp247 are the proton donor and the base catalyst, resp. C-terminal domain A, which was highly flexible in the native enzyme structure, adopts a .alpha./.beta.-fold, also found in DNA/RNA-binding domains. In the substrate-enzyme complex, this polyanion-binding module shifts toward the .beta.-helix groove, forming a tunnel. Thus, from an open conformation which allows for the initial endo-attack of .iota.-carrageenan chains, the enzyme switches to a closed-tunnel form, consistent with its highly processive character, as seen from the electron-microscopy anal. of the degrdn. of .iota.-carrageenan fibers.

L17 ANSWER 2 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2003:616734 A .kappa.-carrageenan derived oligosaccharide prepared by enzymatic degradation containing anti-tumor activity. Mou, Haijin; Jiang, Xiaolu; Guan, Huashi (Department of Food Science and Technology, Ocean University of China, Tsingtao, 266003, Peop. Rep. China). Journal of Applied Phycology, 15(4), 297-303 (English) 2003. CODEN: JAPPEL. ISSN: 0921-8971. Publisher: Kluwer Academic Publishers.
AB Depolymn. of .kappa.-carrageenan was performed using ***carrageenase*** isolated from the cell-free medium of a culture of marine ***Cytophaga*** sp. MCA-2. The low-mol.-wt. carrageenans after ultrafiltration and lyophilization were sulfonated with formamide-chlorosulfonic acid. The anti-tumor activity of the products with different mol. wt. was detd. by using Sarcoma 180 tumor in mouse. A carrageenan oligosaccharide with a mol. wt. of 1726, administered orally at a dose of 100 mg kg-1 mouse markedly inhibited tumor formation. However, the anti-tumor activity of high-sulfonated carrageenan was much less than that of the non-sulfonated or light-sulfonated prepn. The activities of the latter products on superoxide dismutase and catalase were enhanced considerably, which suggests that carrageenan oligosaccharide was effective in promoting the antioxidn. ability and eliminating danger from free radicals. The prepns. showed special effects on immunol. regulation, esp. the phagocytosis ratio and phagocytosis index

of macrophage, which might be beneficial for the anti-tumor activity. Although no anti-tumor activity of this product was detected in vitro, suggesting that its activity differs between in vitro and in vivo, this 1726 mol. wt. product provides a potent clin. use in tumor treatment.

L17 ANSWER 3 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2001:815277 Document No. 136:17230 The . ***iota*** .- ***carrageenase*** of ***Alteromonas*** fortis: A .beta.-helix fold-containing enzyme for the degradation of a highly polyanionic polysaccharide. Michel, Gurvan; Chantalat, Laurent; Fanchon, Eric; Henrissat, Bernard; Kloareg, Bernard; Dideberg, Otto (Laboratoire de Cristallographie Macromoleculaire, Institut de Biologie Structurale Jean-Pierre Ebel, CNRS/Commissariat a l'Energie Atomique, Crenoble, 38027, Fr.). Journal of Biological Chemistry, 276(43), 40202-40209 (English) 2001. CODEN: JBCHA3. ISSN: 0021-9258. Publisher: American Society for Biochemistry and Molecular Biology.
AB Carrageenans are gel-forming hydrocolloids extd. from the cell walls of marine red algae. They consist of D-galactose residues bound by alternate .alpha.(1.fwdarw.3) and .beta.(1.fwdarw.4) linkages and substituted by 1 (.kappa.-carrageenan), 2 (.iota.-carrageenan), or 3 (.lambda.-carrageenan) sulfate-ester groups per disaccharide repeating unit. Both the .kappa.- and .iota.-carrageenan chains adopt ordered conformations leading to the formation of highly ordered aggregates of double-stranded helixes. Several .kappa.- ***carrageenases*** and . ***iota*** .- ***carrageenases*** have been cloned from marine bacteria. .kappa.- ***Carrageenases*** belong to family 16 of the glycoside hydrolases, which essentially encompasses polysaccharidases specialized in the hydrolysis of the neutral polysaccharides such as agarose, laminarin, lichenan, and xyloglucan. In contrast, . ***iota*** .- ***carrageenases*** constitute a novel glycoside hydrolase structural family. Here, the authors report the crystal structure of A. fortis . ***iota*** .- ***carrageenase*** at 1.6 .ANG. resoln. The enzyme was found to fold into a right-handed parallel .beta.-helix of 10 complete turns with 2 addnl. C-terminal domains. Glu-245, Asp-247, or Glu-310, in the cleft of the enzyme, were proposed as candidate catalytic residues. The protein contained 1 Na+- and 1 Cl--binding site, and 3 Ca2+-binding sites shown to be involved in stabilizing the enzyme structure.

L17 ANSWER 4 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2001:365873 Document No. 134:365816 Control of ***carrageenase*** production by coculturing producing bacteria with nonproducing bacteria. Okita, Hiroshi; Nawamura, Takeshi; Adachi, Kyoko; Okano, Itsuho; Nishijima, Miyuki (Kaiyo Biotechnology Laboratory K. K., Japan). Jpn. Kokai Tokkyo Koho JP 2001136961 A2 20010522, 12 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-328167 19991118.
AB Prodn. of carrageenan (I), useful for converting carrageenan into oligosaccharides to widen its application range, is controlled by culturing I-producing bacteria in the presence of I-nonproducing bacteria such as Agrobacterium, ***Cytophaga*** , Flexibacter, etc., or their cultures. ***Cytophaga*** sp. R146 and Agrobacterium sp. R146B were cocultured in a marine broth contg. .kappa.-carrageenan under shaking at 30.degree. for 16 h. Activity of I in the culture was higher than that in a culture of ***Cytophaga*** alone.

L17 ANSWER 5 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2000:813192 Document No. 134:143662 . ***iota*** .- ***Carrageenases*** constitute a novel family of glycoside hydrolases, unrelated to that of .kappa.- ***carrageenases*** . Barbeyron, Tristan; Michel, Gurvan; Potin, Philippe; Henrissat, Bernard; Kloareg, Bernard (Station Biologique de Roscoff, UMR 1931 (CNRS and Laboratoires Goemar), Bretagne, 29680, Fr.). Journal of Biological Chemistry, 275(45), 35499-35505 (English) 2000. CODEN: JBCHA3. ISSN: 0021-9258. Publisher: American Society for Biochemistry and Molecular Biology.
AB . ***iota*** .- ***Carrageenases*** are polysaccharide hydrolases that cleave the .beta.-1,4 linkages between the D-galactose-4-sulfate and 3,6-anhydro-D-galactose-2-sulfate residues in the red algal galactans known as .iota.-carrageenans. We report here on the purifn. of . ***iota*** .- ***carrageenase*** activity from the marine bacterium Zobellia galactanovorans and on the characterization of . ***iota*** .- ***carrageenase*** structural genes. Genomic libraries from this latter bacterium as well as from ***Alteromonas*** fortis were functionally screened for the presence of . ***iota*** .- ***carrageenase*** +

clones. The Z. galactanovorans and A. fortis . ***iota*** .-***carrageenase*** genes encode homologous proteins of 53.4 and 54.8 kDa, resp. Based on hydrophobic cluster anal. and on the 1H NMR monitoring of the products of the over-expressed A. fortis . ***iota*** .- ***carrageenase*** , these enzymes appear to form a new family of glycoside hydrolases, unrelated to that of .kappa.- ***carrageenases*** and with an inverting mechanism of hydrolysis. They both feature a 45-amino acid-long N-terminal segment with sequence similarity to the N-terminal region of several other polysaccharidases. In those for which a three-dimensional structure is available, this conspicuous segment, also deemed "glycanase motif", corresponds to a strand-helix-strand "cap" that covers the N-terminal end of a common, right-handed .beta.-helical fold.

L17 ANSWER 6 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
2000:422733 Document No. 133:27966 Expression, purification, crystallization and preliminary x-ray analysis of the . ***iota*** .-***carrageenase*** from ***Alteromonas*** fortis. Michel, Gurvan; Flament, Didier; Barbeyron, Tristan; Vernet, Thierry; Kloareg, Bernard; Dideberg, Otto (Laboratoire de Cristallographie Macromoleculaire, Institut de Biologie Structurale Jean-Pierre Ebel, CNRS/CEA, Grenoble, 38027, Fr.). Acta Crystallographica, Section D: Biological Crystallography, D56(6), 766-768 (English) 2000. CODEN: ABCRE6. ISSN: 0907-4449. Publisher: Munksgaard International Publishers Ltd..
AB This is the 1st crystn. report of a glycoside hydrolase which belongs to family 82. Here, a recombinant form of His-tagged . ***iota*** .-***carrageenase*** from A. fortis was expressed, purified, and crystd. Crystals were obtained by the vapor-diffusion method using polyethylene glycol (mol. wt. = 6000) as a precipitant. They belonged to space group P21, with unit-cell parameters a = 56.75, b = 91.04, c = 125.01 .ANG., and .beta. = 93.41.degree.. The unit cell contained 2 mols. in the asym. unit related by a non-crystallog. 2-fold axis. The crystals diffracted to 2.0 .ANG. resoln. on a synchrotron beamline.

L17 ANSWER 7 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1998:273415 Document No. 129:78428 The kappa- ***carrageenase*** of the marine bacterium ***Cytophaga*** drobachiensis. Structural and phylogenetic relationships within family-16 glycoside hydrolases. Barbeyron, Tristan; Gerard, Anita; Potin, Philippe; Henrissat, Bernard; Kloareg, Bernard (Centre d'Etudes d'Oceanologie et de Biologie Marine, CNRS, Roscoff, F-29682, Fr.). Molecular Biology and Evolution, 15(5), 528-537 (English) 1998. CODEN: MBEVEO. ISSN: 0737-4038. Publisher: Society for Molecular Biology and Evolution.
AB The authors report here cloning from the marine gliding bacterium ***Cytophaga*** drobachiensis of .kappa.-carrageenanase, a glycoside hydrolase involved in the degrdn. of .kappa.-carrageenan. Structural features in the nucleotide sequence are pointed out, including the presence of an octameric .OMEGA. sequence similar to the ribosome-binding sites of various eukaryotes and prokaryotes. The cgkA gene codes for a protein of 545 aa, with a signal peptide of 35 aa and a 229-aa-long posttranslationally processed C-terminal domain. The enzyme displays the overall folding and catalytic domain characteristics of family 16 of glycoside hydrolases, which comprises other .beta.-1,4-.alpha.-1,3-D/L-galactan hydrolases, .beta.-1,3-D-glucan hydrolases (laminarinases), .beta.-1,4-1,3-D-glucan hydrolases (lichenases), and .beta.-1,4-D-xyloglucan endotransglycosylases. In order to address the origin and evolution of CgkA, a comprehensive phylogenetic tree of family 16 was built using parsimony anal. Family-16 glycoside hydrolases cluster according to their substrate specificity, regardless of their phylogenetic distribution over eubacteria and eukaryotes. Such a topol. suggests that the general homol. between laminarinases, agarases, .kappa.-carrageenanases, lichenases, and xyloglucan endotrans-glycosylases has arisen through gene duplication, likely from an ancestral protein with laminarinase activity.

L17 ANSWER 8 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1998:211387 Document No. 128:204118 Microbial production of kappa-carrageenanase while controlling pH with assimilable nitrogen compounds. Gancet, Christian; Remaud, Simeon Magali; Willemot, Rene Marc (Ceca S. A., Fr.). Fr. Demande FR 2750998 A1 19980116, 8 pp. (French). CODEN: FRXXBL. APPLICATION: FR 1996-8530 19960709.
AB Microbial prodn. of .kappa.-carrageenanase is enhanced when the pH is

controlled by addn. of assimilable N compds. (such as NH3 and org. amines) to the fermn. medium. Thus, when the pH was controlled with NH3, .kappa.-***carrageenase*** prodn. with Pseudomonas carrageenovora was increased 5.2-fold relative to pH control using Na2CO3.

L17 ANSWER 9 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1995:479975 Document No. 123:106296 Processing and hydrolytic mechanism of the cgkA-encoded .kappa.-***carrageenase*** of ***Alteromonas*** carrageenovora. Potin, Philippe; Richard, Christophe; Barbeyron, Tristan; Henrissat, Bernard; Gey, Claude; Petillot, Yves; Forest, Eric; Dideberg, Otto; Rochas, Cyrille; et al. (Centre d'Etudes d'Oceanographie et de Biologie Marine, CNRS, Roscoff, Fr.). European Journal of Biochemistry, 228(3), 971-5 (English) 1995. CODEN: EJBCAI. ISSN: 0014-2956. Publisher: Springer.
AB The cgkA gene of A. carrageenovora encodes a .kappa.-***carrageenase*** (I) with a predicted mol. wt. of 44,212, much larger than the 35 kDa estd. from SDS-PAGE of the protein purified from culture supernatants. Immunoblotting expts. showed the presence of a protein of 44 kDa in both native and recombinant bacterial intracellular exts., suggesting that I is produced as a preproprotein which undergoes proteolytic processing twice during secretion. To det. the exact site of C-terminal cleavage, the precise mol. wt. of purified extracellular I was measured by electrospray-ionization/mass spectrometry and found to be 31,741. Mature I of A. carrageenovora thus appears to be composed of 275 amino acids, from residue Ala-26 to residue Asn-301 of the cgkA gene product. To assess the mol. mechanism of this member of family 16 of glycosyl hydrolases, hydrolysis of neocarrahexaitol by I was monitored by gel filtration chromatog. and 13C NMR. The results show that neocarrabiitol and .beta.-neocarratetraose were initially formed, demonstrating that I operates with a mol. mechanism retaining the anomeric configuration. Consistent with this result, I was also shown to be able to catalyze transglycosylation.

L17 ANSWER 10 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1994:676227 Document No. 121:276227 Bacteria of the genus ***Alteromonas*** : systematics, physiologically active compounds. Mikhailov, V. V.; Ivanova, E. P. (Pacific Inst. Bioorgan. Chem., Russian Acad. Sci., Vladivostok, 690022, Russia). Biologiya Morya (Vladivostok), 20(3), 171-80 (Russian) 1994. CODEN: BIMOD4. ISSN: 0134-3475. Publisher: Nauka.
AB A review with 81 refs. Aerobic heterotrophic nonpathogenic Gram-neg. true marine bacteria of the genus ***Alteromonas*** are scientifically and practically important. Marine microorganisms generally and alteromonads in particular are the producers of unique bioactive metabolites which were not obsd. in terrestrial microorganisms. Studies of bioactive metabolites of marine bacteria of the genus ***Alteromonas*** and systematics of this genus (14 species) have been reviewed. Alteromonads producing antibiotics (brominated compds., isatin), antitumor agents (alteramid, bisucaberin), C16 arom. acids, tetrodotoxin, inhibitors of proteinases (marinostatins, monostatins), enzymes (highly active alk. phosphatase, ***carrageenases*** , tyrosinases, restriction endonucleases) and some other substances have been described.

L17 ANSWER 11 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1994:474803 Document No. 121:74803 The gene encoding the kappa-***carrageenase*** of ***Alteromonas*** carrageenovora is related to .beta.-1,3-1,4-glucanases. Barbeyron, Tristan; Henrissat, Bernard; Kloareg, Bernard (Cent. Etudes Oceanol. Biol. Marine, Roscoff, F-29680, Fr.). Gene, 139(1), 105-9 (English) 1994. CODEN: GENED6. ISSN: 0378-1119.
AB The nucleotide (nt) and deduced amino acid (aa) sequences are reported for the structural gene cgkA encoding .kappa.-***carrageenase*** (Mr 44,412) from the marine bacterium ***Alteromonas*** carrageenovora (ATCC 43555), a hydrolase involved in the degrdn. of .kappa.-carrageenan. The cgkA gene codes for a protein of 397 aa, with a signal peptide of 25 aa. The enzyme is a new member of family 16 of glycosyl hydrolases, which comprises .beta.-1,3-1,4-glucanases from various sources and the .beta.-agarase of Streptomyces coelicolor. It is proposed that residue Glu163 in the .kappa.-***carrageenase*** from A. carrageenovora and Glu155 in the .beta.-agarase from S. coelicolor are important for catalysis.

L17 ANSWER 12 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1992:443939 Document No. 117:43939 Production of protoplasts from the red alga Chondrus crispus. Application to the quantification of nuclear DNA and to the evaluation of GC%. Le Gall, Y.; Brown, S.; Marie, D.; Mejjad, M.; Kloareg, B. (Cent. Etud. Oceanol. Biol. Marine, Univ. Paris VI, Roscoff, 29682, Fr.). Oceanis, 18(1), 11-17 (English) 1992. CODEN: OCAND8. ISSN: 0182-0745.

AB Protoplast isolation involved the use of concd. kappa- and ***iota*** -***carrageenases*** , produced from cultures of 2 marine bacteria, ***Alteromonas*** carrageenovora and ***Cytophaga*** drobachiensis. In assocn. with cellulase, these enzymes proved very efficient for the isolation of protoplasts from both gametophytes and tetrasporophytes of C. crispus, resulting in yields in the range 1-9 .times. 108 protoplasts per g fresh tissue. In culture, protoplasts of C. crispus exhibited cell-wall regeneration followed by cell division or elongation. Flow cytometry anal. of nuclei isolated from protoplasts of C. crispus was used to quantify the abs. amts. of nuclear DNA per cell and to evaluate the GC%. Nuclei were independently stained with 3 fluorescent dyes, Hoechst 33342, mithramycin, and ethidium bromide. For the first 2 dyes, a nonlinear relation was used to convert fluorescence intensity into base-pair content. A similar approach was applied to nuclei isolated from protoplasts of 9 other species of seaweeds belonging to the Rhodophyceae, Phaeophyceae, and Ulvophyceae.

L17 ANSWER 13 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1991:577904 Document No. 115:177904 Purification and characterization of a new .kappa.- ***carrageenase*** from a marine ***Cytophaga*** -like bacterium. Potin, Philippe; Sanseau, Alain; Le Gall, Yvan; Rochas, Cyrille; Kloareg, Bernard (Stn. Biol., CNRS, Roscoff, Fr.). European Journal of Biochemistry, 201(1), 241-7 (English) 1991. CODEN: EJBCAI. ISSN: 0014-2956.

AB A bacterial strain able to degrade various sulfated galactans (carrageenans and agar) was isolated from the marine red alga, ***Delesseria*** sanguinea. From the cell-free supernatant of cultures grown on crude .lambda.-carrageenan, a .kappa.- ***carrageenase*** (I) was purified by (NH4)2SO4 fractionation, gel filtration on Sephacryl S 200 HR and ion-exchange chromatog. on DEAE-Sepharose-CL6B. Purified I was detected as a single protein upon SDS-PAGE. Its mol. wt. was estd. at 40,000. I activity was obsd. against .kappa.-carrageenan over the pH range 5.0-8.5 and was optimal at pH 7.2 in Tris buffer or 7.0 in Mops buffer. I remained stable at 30.degree., but only for up to 1 h at 40.degree.. Anal. of the degrdn. products of I by gel filtration and 13C NMR spectroscopy indicated that the enzyme degrades .kappa.-carrageenan down to the level of the .kappa.-neocarratetraose sulfate. The properties of this new enzyme were compared with those of previously characterized ***carrageenases*** .

L17 ANSWER 14 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1988:108600 Document No. 108:108600 Purification of a .kappa.-***carrageenase*** from marine ***Cytophaga*** species. Sarwar, Golam; Matayoshi, Seiken; Oda, Hiroshi (Fac. Med., Kagoshima Univ., Kagoshima, 890, Japan). Microbiology and Immunology, 31(9), 869-77 (English) 1987. CODEN: MIIMDV. ISSN: 0385-5600.

AB A mixt. of extracellular ***carrageenases*** was isolated from the cell-free medium of a culture of marine ***Cytophaga*** species IK-C783 grown on ZoBell 2216 E broth with 0.1% com. carrageenan. A single active peak of .kappa.- ***carrageenase*** was sepd. and purified from the mixt. by (NH4)2SO4 pptn., ion-exchange chromatog., and Sephadex G-200 gel filtration chromatog. The mol. wt. of the purified .kappa.-***carrageenase*** was estd. as 100,000 by SDS-PAGE. The purified .kappa.- ***carrageenase*** had a pH optimum of 7.6 and a temp. optimum of 25.degree..

L17 ANSWER 15 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1985:484721 Document No. 103:84721 Potentiality of artificial sea water salts for the production of ***carrageenase*** by a marine ***Cytophaga*** sp. Sarwar, Golam; Oda, Hiroshi; Sakata, Taizo; Kakimoto, Daiichi (Fac. Med., Kagoshima Univ., Kagoshima, 890, Japan). Microbiology and Immunology, 29(5), 405-11 (English) 1985. CODEN: MIIMDV. ISSN: 0385-5600.

AB Prodn. of an extracellular enzyme complex (***carrageenase***) was studied by examg. cell-free fluids from cultures of a marine ***Cytophaga*** , 1k-C783, growing on different media. Among artificial sea water salts, only NaCl and MgCl2 were utilized by the organism to produce ***carrageenase*** . The minimal concns. of suitable combinations of NaCl and MgCl2 were 0.05M NaCl plus 0.25M MgCl2, and 0.15M NaCl plus 0.15M MgCl2. KCl and CaCl2 did not have any role in ***carrageenase*** prodn. in ZoBell 2216 E broth medium. ***Carrageenase*** was synthesized continuously within the resting cells and was released from the cells as well as in the growing cells, when nutrient had been supplied.

L17 ANSWER 16 OF 16 CAPLUS COPYRIGHT 2003 ACS on STN
1984:48181 Document No. 100:48181 ***Carrageenase*** from marine ***Cytophaga*** . I. The production and characteristics of ***carrageenase*** from marine ***Cytophaga*** . Sarwar, Golam; Sakata, Taizo; Kakimoto, Daiichi (Fac. Fish., Kagoshima Univ., Kagoshima, 890, Japan). Nippon Suisan Gakkaishi, 49(11), 1689-94 (English) 1983. CODEN: NSUGAF. ISSN: 0021-5392.
AB The prodn. and characteristics of carrageenan-decompg. enzyme from the cell-free medium of marine ***Cytophaga*** 1k-C783 were studied. Artificial sea water components were necessary for enzyme prodn. and bacterial growth, but glucose, galactose, and cellobiose inhibited both activities. Optimal activity was at pH 7 and at 25-50.degree.. However, at >50.degree. enzyme activity became unstable and it was totally inactivated by heat treatment at 55.degree. for 10 min. HgCl2, AgNO3 (1 mM), and NaCl at .gtoreq.1.5% completely inhibited the enzyme activity.

```
=> E BARBEYRON T/AU
=> S E3,E4
             4 "BARBEYRON T"/AU
            22 "BARBEYRON TRISTAN"/AU
L18         26 ("BARBEYRON T"/AU OR "BARBEYRON TRISTAN"/AU)

=> E POTIN P/AU
=> S E3-E6
            14 "POTIN P"/AU
             1 "POTIN PH"/AU
            68 "POTIN PHILIPPE"/AU
             1 "POTIN PHILLIPE"/AU
L19         84 ("POTIN P"/AU OR "POTIN PH"/AU OR "POTIN PHILIPPE"/AU OR "POTIN
               PHILLIPE"/AU)

=> E RICHARD C/AU
=> S E3,E45,E46,
          8142 E3
            79 E45
            47 E46
L20          0 E3,E45,E46,
                 (E3(W)E45(W)E46)

=> E RICHARD C/AU
=> S E3,E45,E46
           182 "RICHARD C"/AU
             3 "RICHARD CHRISTOPH"/AU
            15 "RICHARD CHRISTOPHE"/AU
L21        200 ("RICHARD C"/AU OR "RICHARD CHRISTOPH"/AU OR "RICHARD CHRISTOPHE
               "/AU)

=> E HENRISSAT/AU
=> S E4,E5
            34 "HENRISSAT B"/AU
           131 "HENRISSAT BERNARD"/AU
L22        165 ("HENRISSAT B"/AU OR "HENRISSAT BERNARD"/AU)

=> E YVIN/AU
=> S E4,E5
             4 "YVIN J C"/AU
            43 "YVIN JEAN CLAUDE"/AU
L23         47 ("YVIN J C"/AU OR "YVIN JEAN CLAUDE"/AU)
```

=> E KLOAREG/AU
=> S E4,E5
            21 "KLOAREG B"/AU
            72 "KLOAREG BERNARD"/AU
L24   93 ("KLOAREG B"/AU OR "KLOAREG BERNARD"/AU)

=> S L18,L19,L21,L22,L23,L24
L25   537 (L18 OR L19 OR L21 OR L22 OR L23 OR L24)

=> S L25 AND L13
L26   14 L25 AND L13

=> S L26 NOT L17
L27   5 L26 NOT L17

=> D 1-5 CBIB ABS

L27 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2003 ACS on STN
2001:483786 Document No. 135:164066 The .kappa.- ***carrageenase*** of P. carrageenovora features a tunnel-shaped active site. A novel insight in the evolution of clan-B glycoside hydrolases. Michel, G.; Chantalat, L.; Duee, E.; ***Barbeyron, T.*** ; ***Henrissat, B.*** ; ***Kloareg,*** *** B.*** ; Dideberg, O. (Laboratoire de Cristallographie Macromoleculaire, CNRS/CEA, Institut de Biologie Structurale Jean-Pierre Ebel, Grenoble, 38027, Fr.). Structure (Cambridge, MA, United States), 9(6), 513-525 (English) 2001. CODEN: STRUE6. ISSN: 0969-2126. Publisher: Cell Press.
AB .kappa.-Carrageenans are gel-forming, sulfated 1,3-.alpha.-1,4-.beta.-galactans from the cell walls of marine red algae. .kappa.-***Carrageenase*** (I) from the marine, gram-neg. bacterium, Pseudoalteromonas carrageenovora, degrades .kappa.-carrageenan both in soln. and in solid state by an endoprocessive mechanism. This .beta.-galactanase belongs to the clan-B of glycoside hydrolases. Here, the structure of P. carrageenovora I was solved to 1.54 .ANG. resoln. by the multiwavelength anomalous diffraction (MAD) method, using a selenomethionine-substituted form of the enzyme. I was found to fold into a curved .beta.-sandwich with a tunnel-like active site cavity. Another remarkable characteristic was the presence of an Arg residue at subsite -1. The crystal structure of P. carrageenovora I is the 1st 3-dimensional structure of a ***carrageenase*** . Its tunnel-shaped active site, the 1st to be reported for enzymes other than cellulases, suggests that such tunnels are assocd. with the degrdn. of solid polysaccharides. Clan-B glycoside hydrolases fall into 2 subgroups, one with catalytic machinery held by an ancestral .beta.-bulge, and the other in which it is held by a regular .beta.-strand. At subsite -1, all of these hydrolases exhibit an arom. amino acid that interacts with the hexopyranose ring of the monosaccharide undergoing catalysis. In addn., in I, an Arg residue recognizes the sulfate-ester substituents of the .beta.-linked .kappa.-carrageenan monomers. It also appears that, in addn. to the nucleophile and acid/base catalysts, 2 other amino acids are involved with the catalytic cycle, accelerating the deglycosylation step.

L27 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2003 ACS on STN
2001:154381 Document No. 134:368495 A rapid method for the separation and analysis of carrageenan oligosaccharides released by iota- and kappa-***carrageenase*** . Knutsen, S. H.; Sletmoen, M.; Kristensen, T.; ***Barbeyron, T.*** ; ***Kloareg, B.*** ; ***Potin, P.*** (Institute of Chemistry and Biotechnology, Agricultural University of Norway, Aas, N-1432, Norway). Carbohydrate Research, 331(1), 101-106 (English) 2001. CODEN: CRBRAT. ISSN: 0008-6215. Publisher: Elsevier Science Ltd..
AB Based on the improved performances in speed of chromatog. sepn. on Superdex-type materials (Pharmacia) compared to conventional media such as Sephadex and Bio Gel-type, a rapid size-exclusion chromatog. (SEC) method was developed for the sepn. and anal. of carrageenan oligosaccharides. It was used to evaluate the elution profiles of hydrolyzates produced by ***carrageenases*** specific for kappa- and iota-carrageenans. Oligosaccharide peaks ranging from di- to dodeca-saccharides were obtained in about 20 min on an anal. scale, whereas preparative runs were completed in a few hours. The method may also be used to monitor polysaccharide degrdn.

L27 ANSWER 3 OF 5 CAPLUS COPYRIGHT 2003 ACS on STN
1999:269510 Document No. 131:84641 Expression, purification, crystallization and preliminary X-ray analysis of the .kappa.- ***carrageenase*** from Pseudoalteromonas carrageenovora. Michel, Gurvan; ***Barbeyron,*** *** Tristan*** ; Flament, Didier; Vernet, Thierry; ***Kloareg, Bernard*** ; Dideberg, Otto (Laboratoire de Cristallographie Macromoleculaire, Institut de Biologie Structurale Jean-Pierre Ebel, CNRS/CEA, Grenoble, 38027, Fr.). Acta Crystallographica, Section D: Biological Crystallography, D55(4), 918-920 (English) 1999. CODEN: ABCRE6. ISSN: 0907-4449. Publisher: Munksgaard International Publishers Ltd..

AB A recombinant form of His-tagged .kappa.- ***carrageenase*** from Pseudoalteromonas carrageenovora has been expressed, purified and crystd. Crystals have been obtained by the vapor-diffusion method using polyethylene glycol (Mr = 4000) as a precipitant. These crystals belong to the space group P212121, with unit-cell parameters a = 58.2, b = 62.8, c = 77.9 .ANG., and diffract to 2.2 .ANG. resoln. on a rotating-anode X-ray source.

L27 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2003 ACS on STN
1997:116020 Document No. 126:289800 Evidence of sulfohydrolase activity in the red alga Calliblepharis jubata. Zinoun, M.; Diouris, M.; ***Potin,*** *** P.*** ; Floc'h, J. Y.; Deslandes, E. (Laboratoire Ecophysiologie Biochimie Algues Marines, Brest, F-29285, Fr.). Botanica Marina, 40(1), 49-53 (English) 1997. CODEN: BOTNA7. ISSN: 0006-8055. Publisher: de Gruyter.

AB An enzyme able to catalyze the conversion of carrageenan percursors into iota-carrageenan has been demonstrated in the red alga Calliblepharis jubata using a procedure based on 35S-labeled carrageenan. Labeled carrageenan precursors were first obtained by feeding Calliblepharis jubata with 35SO42- -artificial seawater under optimal conditions for carrageenan synthesis. Then a ***iota*** - ***carrageenase*** was applied to the 35S-labeled extd. carrageenan. Subsequently the carrageenan fraction resistant to the ***iota*** - ***carrageenase*** was used as a substrate for the sulfohydrolase reaction. Finally the sulfohydrolase activity was detected by measuring the labeled sulfate released from the 35S carrageenan polymer resistant to the ***iota*** - ***carrageenase*** . The sulfohydrolase extd. from Calliblepharis jubata was pptd. between 2.5 and 4.2 M (NH4)2 SO4 and partly purified on a Sephadex G-75 column. Protein fractions showing the enzyme activity was routinely used for sulfohydrolase characterization.

L27 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2003 ACS on STN
1993:666356 Document No. 119:266356 Isolation of protoplasts from Kappaphycus alvarezii var. tambalang (Rhodaphyta) and secretion of .iota.-carrageenan fragments by cultured cells. Zablackis, E.; Vreeland, V.; ***Kloareg, B.*** (CEOBM, Univ. Paris, Roscoff, 29682, Fr.). Journal of Experimental Botany, 44(266), 1515-22 (English) 1993. CODEN: JEBOA6. ISSN: 0022-0957.

AB A method for generating protoplasts from the carrageenan-producing red alga Kappaphycus alvarezii was developed. Digestions with cellulase and .kappa.- ***carrageenase*** produced only a few corticol cell protoplasts, while digestions with cellulase and . ***iota*** .- ***carrageenase*** only produced epidermal cell protoplasts. When both ***carrageenases*** were used in the digestion media with cellulase, protoplasts were released from all cell types and yields ranged from 1.0 to 1.2 .times. 107 cells g-1 with sizes from 5 to 200 .mu.m diam. Protoplasts were subsequently cultured to study cell wall regeneration. Calcofluor-pos. material (probably cellulose) was detected within 6 h after removal of protoplasts from the wall digestion media, whereas .iota.-carrageenan fragments were detected in all regenerating protoplast cultures 24 h after removal from the digestion media. Protoplasts continued to produce Calcofluor-pos. material and secrete carrageenan fragments into culture media for several days. However, cells cultured in media augmented with K+ ions stopped secreting carrageenan fragments after 24 h. Cells cultured for 48 h in seawater labeled weakly with an .iota.-carrageenan hybridization probe, but not at all with a corresponding .kappa.-probe. Cells cultured for 48 h, blotted to nylon membranes and probed with anti-carrageenan monoclonal antibodies, showed the presence of gelling carrageenan subunits in the cell walls.

	L #	Hits	Search Text	DBs
1	L9	9	L8 AND L4	USPAT ; US-PG PUB
2	L8	380	L5 OR L6 OR L7	USPAT ; US-PG PUB
3	L7	8	DELESSERIA	USPAT ; US-PG PUB
4	L6	241	CYTOPHAGA	USPAT ; US-PG PUB
5	L5	163	ALTEROMONAS	USPAT ; US-PG PUB
6	L4	21	L1 OR L3	USPAT ; US-PG PUB
7	L3	5	L2 ADJ L1	USPAT ; US-PG PUB
8	L2	1461	IOTA	USPAT ; US-PG PUB
9	L10	12	L4 NOT L9	USPAT ; US-PG PUB
10	L1	21	CARRAGEENASE	USPAT ; US-PG PUB